

SPO-591
Serial No. 09/787,395
August 16, 2001



ATTACHMENT 1

Please amend the specification as follows:

Page 4, lines 25-30.

That is, the present invention is concerned with a curable composition which, when cured, exhibits an L-scale Rockwell hardness of not smaller than [65] 60, comprising:

A) a polymerizable monomer which, when homopolymerized, exhibits the L-scale Rockwell hardness of not larger than 40;

Page 8, line 33 to page 9, line 8.

The monomer represented by the above general formula is usually obtained in the form of a mixture of molecules having different molecular weights. Therefore, t and $[t'']$ t' representing the numbers of the alkylene oxide units in the above formula (1), are expressing average numbers of the units in the whole mixture. Here, t and t' are, independently from each other, 0 to 70 in average. When t' is 0, the alkylene oxide unit is of a single kind. When t' is other than 0, there are represented alkylene oxide units of different kinds recurring in a unit of a block.

Page 11, lines 21 to 23.

Among them, it is desired that a relationship between R^5 and R^7 in the general formula (2) becomes the same as a relationship between R^1 and R^4 in the general formula [(2)] (1).

Page 18, line 35 to page 19, line 1.

The high-hardness monomer 2 imparts impact resistance to the cured product that is obtained and works to favorably exhibit photochromic properties such as fading rate maintaining good balance. From the standpoint of exhibiting the above effect to a conspicuous degree, it is desired that the [low-hardness] high-hardness monomer 2 has the L-scale Rockwell hardness of 65 to 120.

Page 44, line 1-9.

GA: Glycidyl acrylate (homo-HL < 20).

AcPEGMA (524): Acetylpolyethylene glycol methacrylate having an average molecular weight of 524 (homo-HL < 20).

DAPEG (258): Polyethylene glycol diacrylate having an average molecular weight of 258 (homo-HL < 20). DAPEG

(522): Polyethylene glycol diacrylate having an average molecular weight of 522 (homo-HL < 20).

MeAPEG [(428)] (482): Methyl ether polyethylene glycol

acrylate having an average molecular weight of 482 (homo-HL < 20).

Page 54, First and second left had column.

Ex. No.	Low-hardness monomer	(parts by wt)	
42	MAPEG(526)	10	
43	MAPEG(526)	10	
44	PEGGMA(538)	10	
45	GA	5	
46	GA	5	
47	AcPEGMA(524)	10	
48	DAPEG(258)	10	
49	DAPEG(522)	10	
50	MeAPEG [(428)]	<u>(482)</u>	10
51	MeA	10	
52	BuA	10	
53	C12A	10	
54	MeSMAPEG(640)	10	
55	PEGE(774)	10	
56	PESGE(834)	10	
57	MeMAPEG(1100)	6	
58	MeMAPEG(1100)	6	

Page 61, lines 2-23

0.3 Parts by weight of the chromene 1 and 1 part by weight of the perbutyl ND as the polymerization initiator, were added to 100 parts by weight of polymerizable monomers comprising 20 parts by weight of TMPT, 55 parts by weight of tetraethylene glycol dimethacrylate, 7 parts by weight of glycidyl methacrylate, 5 parts by weight of α MS, 1 part by weight of MSD and 12 parts by weight of MAPEG 526, and were mixed to a sufficient degree. This mixture solution was poured into a mold constituted by ADC resin plate (1.5 mm thick), a glass plate and a gasket of an ethylene/vinyl acetate copolymer, and was cast-polymerized. The

polymerization was conducted by using an air furnace while gradually raising the temperature from 30°C to 90°C over a period of 18 hours and maintaining the temperature at 90° for 2 hours. After the polymerization has been finished, the polymer was removed from the glass mold. There was obtained the polymer (2.0 mm thick) having a photochromic layer of a thickness of 0.5 mm formed on one surface thereof. The polymer was evaluated for its photochromic properties and base member properties by the same methods as those of Example 1. The results were as shown in Table [5] 9.

Page 63, lines 1-18.

As described above, the base member obtained from a polymerizable monomer having HL of not higher than 40 exhibits excellent photochromic properties but is not practicable because of its low heat resistance. The matrix obtained from a polymerizable monomer having HL of not smaller than 60 exhibits practicable substrate characteristics but insufficient photochromic properties. Both properties, i.e., photochromatic properties and matrix properties, are satisfied by using a polymerizable monomer having HL of not higher than 40, a difunctional polymerizable monomer having HL of not smaller than 60, and

a [difunctional] polyfunctional polymerizable monomer
having HL of not smaller than 60 in combination.

Photochromic cured products of Examples 1 to 58 of the
present invention exhibit well-balanced photochromic
properties such as color density, fading rate and hardness,
as well as impact resistance and heat resistance which are
properties of the matrix.

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Page 4, lines 25-30.

That is, the present invention is concerned with a curable composition which, when cured, exhibits an L-scale Rockwell hardness of not smaller than 60, comprising: A) a polymerizable monomer which, when homopolymerized, exhibits the L-scale Rockwell hardness of not larger than 40;

Page 8, line 33 to page 9, line 8.

The monomer represented by the above general formula is usually obtained in the form of a mixture of molecules having different molecular weights. Therefore, t and t' representing the numbers of the alkylene oxide units in the above formula (1), are expressing average numbers of the units in the whole mixture. Here, t and t' are, independently from each other, 0 to 70 in average. When t' is 0, the alkylene oxide unit is of a single kind. When t' is other than 0, there are represented alkylene oxide units of different kinds recurring in a unit of a block.

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Among them, it is desired that a relationship between R^5 and R^7 in the general formula (2) becomes the same as a relationship between R^1 and R^4 in the general formula (1).

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(522): Polyethylene glycol diacrylate having an average molecular weight of 522 (homo-HL < 20).

MeAPEG (482): Methyl ether polyethylene glycol acrylate having an average molecular weight of 482 (homo-HL < 20).

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acetate copolymer, and was cast-polymerized. The polymerization was conducted by using an air furnace while gradually raising the temperature from 30°C to 90°C over a period of 18 hours and maintaining the temperature at 90° for 2 hours. After the polymerization has been finished, the polymer was removed from the glass mold. There was obtained the polymer (2.0 mm thick) having a photochromic layer of a thickness of 0.5 mm formed on one surface thereof. The polymer was evaluated for its photochromic properties and base member properties by the same methods as those of Example 1. The results were as shown in Table 9.

Page 63, lines 1-18.

As described above, the base member obtained from a polymerizable monomer having HL of not higher than 40 exhibits excellent photochromic properties but is not practicable because of its low heat resistance. The matrix obtained from a polymerizable monomer having HL of not smaller than 60 exhibits practicable substrate characteristics but insufficient photochromic properties. Both properties, i.e., photochromatic properties and matrix properties, are satisfied by using a polymerizable monomer having HL of not higher than 40, a difunctional polymerizable monomer having HL of not smaller than 60, and


a polyfunctional polymerizable monomer having HL of not smaller than 60 in combination. Photochromic cured products of Examples 1 to 58 of the present invention exhibit well-balanced photochromic properties such as color density, fading rate and hardness, as well as impact resistance and heat resistance which are properties of the matrix.

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ATTACHMENT 3

Please amend the Claims as follows:



12. A curable composition according to claim 1,
wherein the whole polymerizable monomer contained in the
curable composition contains a polymerizable monomer having
at least one epoxy group in an amount of 0.01 to 40% by
mass. [and, preferably, from 0.1 to 30% by mass.]

17. A photochromic cured product of claim [15] 16,
which is a lens.

18. A photochromic cured product of claim [15] 16,
which is a coated layer on the lens.

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ATTACHMENT 4

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Please amend the Claims as follows:

12. A curable composition according to claim 1,
wherein the whole polymerizable monomer contained in the
curable composition contains a polymerizable monomer having
at least one epoxy group in an amount of 0.01 to 40% by
mass.
17. A photochromic cured product of claim 16, which
is a lens.
18. A photochromic cured product of claim 16, which
is a coated layer on the lens.